Discussion Section 1

AMS 131
3 Apr 19

T-F

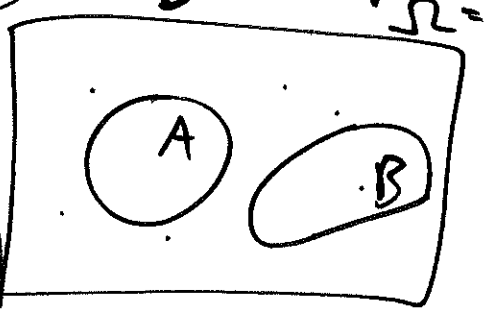
$P(A)$ ← sets

↑ probability of

Stone's Representation Theorem

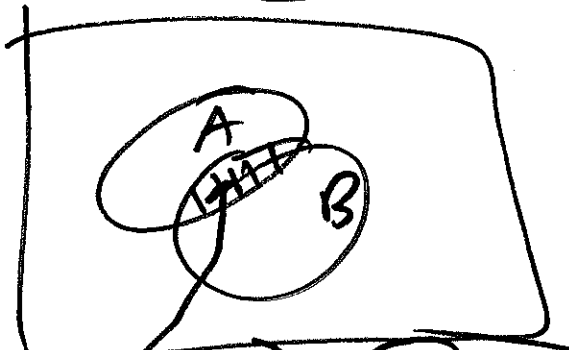
(dart lands in blob A)

no overlap $\Omega = S$



$P(A \text{ or } B) = P(A) + P(B)$

addition rule for or (mutually exclusive)



(A and B)

no overlap between A & B: A, B mutually exclusive

general addition rule for OR

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

DS p. 15 #8

DS p. 21 #14

Disc. Sec. ① | DS p. 15 # 8 | $S = \{A, B, AB, O\}$ O

$A_* = \{$ blood reacts with anti-A $\}$ ← T-F

$= \{A, AB\} = (A$ or $AB)$ ← subset

$B_* = \{$ blood reacts with anti-B $\}$

$= \{B, AB\} = (B$ or $AB)$

sample space S: $\Omega = \{A, B, AB, O\}$

$A_*^c = \{B, O\}$ | $B_*^c = \{A, O\}$

$\{A\} = (A_*$ and $B_*^c)$ | $\{B\} = (B_*$ and $A_*^c)$

$\{AB\} = (A_*$ and $B_*)$ | $\{O\} = (A_*^c$ and $B_*^c)$

DS p. 21 # 14 | $P(O) = 0.5$ | $P(A) = 0.34$

$P(B) = 0.12$ | (a) $P(A_*) = P(A$ or $AB)$

$$P(A_*) = P(A \text{ or } AB) \overset{\text{no overlap}}{=} P(A) + P(AB)$$ (2)

$$P(AB) = 1 - P(A) - P(B) - P(0)$$

$$= 1 - 0.34 - 0.12 - 0.5$$

$$= 0.04$$

$\therefore P(A_*) = P(A) + P(AB)$

$= 0.34 + 0.04$

$= 0.38$

$$P(B_*) = P(B \text{ or } AB)$$

$\overset{\text{no overlap}}{=} P(B) + P(AB) = 0.12 + 0.04 = 0.16$

(b)

$P(A_* \text{ and } B_*) = P(AB) = 0.04$ DS p.35 #1

$P(\text{sum of 2 fair dice is odd}) = \frac{1}{2}$ intuition

ECM 1-6

$S = \{(1,1), (1,2), \ldots, (6,6)\}$

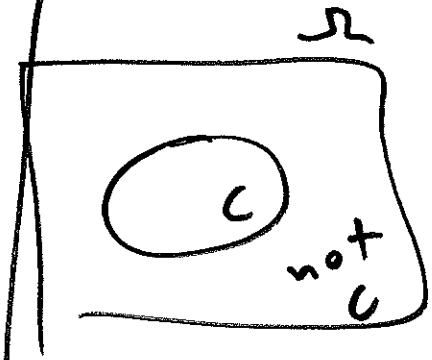
die 1, die 2

$P(A_*) = P(A \text{ or } AB)$ (no overlap)

$= P(A) + P(AB)$

$= 0.34 + 0.04 = 0.38$

$P(AB) = P[\text{not}(0 \text{ or } A \text{ or } B)]$



$P(C) + P(\text{not } C) = 1$

$P(C) = 1 - P(\text{not } C)$

direct

indirect

no overlap

$P(AB) = 1 - P(0 \text{ or } A \text{ or } B)$

$= 1 - (0.5 + 0.34 + 0.12)$

$= 0.04$

$P(\text{both react}) = P(AB) = 0.04$

$$P(B_*) = P(B \text{ or } AB) = P(B) + P(AB)$$

$$= 0.12 + 0.04 = 0.16$$

DS

25 #1

#2

P(sum of #s facing up on 2 fair ⊛ die rolls is odd)

balanced → fair

equal prob.

independence

die #2

die #1	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

ELM 7.

die #1 \ die #2	odd	even
odd	even	odd
even	odd	even

$P(*) = \frac{12}{4}$

36 elemental outcomes (EOs), equally likely

$$P(*) = \frac{18}{36} = \frac{1}{2}$$

$$P(\text{even sum}) = \frac{1}{2}$$

$$P(|X_1 - X_2| < 3) = 1 - \frac{12}{36} = \frac{2}{3}$$

H on die 1

H on die 2

(diff)

	1	2	3	4	5	6
1	0	-1	-2	-3	-4	-5
2	+1	0	-1	-2	-3	-4
3	2	+1	0	-1	-2	-3
4	3	2	+1	0	-1	-2
5	4	3	2	+1	0	-1
6	5	4	3	2	+1	0